RESEARCH

Geographical Information System-Based Fisheries Database for Idaho

2002 Progress Report

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ABSTRACT

Decision makers need easy access to historical and current fishery data to be able to make informed decisions on the direction of land management activities. The data needs to be available in an easy to understand format. The Bureau of Land Management (BLM) and the Idaho Department of Fish and Game (Department) have entered a Challenge Cost Share project to consolidate statewide fishery data into a centralized database repository and display the data spatially using the Geographical Information System. Fish data has been gathered from the Department and BLM regional offices in the northern portion of Idaho. To date, 90% of this file data has been entered into the Idaho Fish & Wildlife Information System (IFWIS) database.

INTRODUCTION

Idaho Department of Fish and Game (Department) and Bureau of Land Management (BLM) have conducted numerous stream and riparian inventories within numerous watersheds across the state of Idaho. Data and data analysis for these surveys are housed at BLM and Department field offices and reside on local computers and in file cabinets. Biologists have used various protocols and formats for acquiring and storing the data. Data acquisition and storage standards make compiling data for a particular watershed or project planning area tedious and time-consuming. The advent of Geographic Information Systems (GIS) has made locating and compiling data far more efficient and effective. Linking biological data to geographic location allows combining information from multiple data sets and sources. Unfortunately, much legacy data has been stored without a geographic locator (e.g.. UTM (Universal Transverse Mercator) or Latitude/Longitude (decimal degrees value). Rather, much data is recorded with a mapped description, the map itself, a legal location, or an aerial photo. By converting location data to UTM or Latitude/Longitude values and storing the data in electronic format it becomes possible to locate and access large amounts of data quickly. The time needed to assimilate, analyze data, and complete projects can be greatly reduced. Analysis products are more easily displayed and more accurate.

A two-year Challenge Cost Share project between the Department and the BLM began in May 2001 to relate agency file data to geographic locations and enter file data in electronic format. The goal is to make fish and fish habitat data in Idaho more available so it can be put to better use in making resource management decisions. The objective is to develop an electronic data management system. Tasks include consolidating, gathering information from the Department's regional and research field offices and the BLM field offices, and developing maps. The fishery data will be stored in a central database repository. The data will be available in database format and could be displayed spatially on maps developed through the GIS.

METHODS

Technicians traveled to various BLM and Department field offices to gather fishery data from file cabinets, old computer floppy disks, CDs, and computer hard drives. Technicians looked for fishery data that contained, at a minimum, stream name, date surveyed (at least a year), the fish species collected, and the number of fish captured or observed. Additional data that was desired included a geographic locator (UTM, latitude/longitude, Range/Township/Section, or a map), transect length and transect width, and sampling method. Photocopies of data sheets and copies of electronic files were made and brought to Department headquarters in Boise.

"File cabinet" data was obtained from report tables or hard copies of raw field data. This data was verified and summarized before entering the data into the Department's Fisheries Information System (FIS) database (Murdock 1999). Verification required the technicians to locate a sampled stream on a map to determine the stream's main drainage so the correct stream could be selected (many streams have the same name) from the FIS hydrography table during data entry. Summarization of the fish data required technicians to total the number of fish sampled by species, electrofishing pass, transect, and stream if the fish were collected in a stream. If the fish were collected from a lake, they were totaled by species and sampling method.

"Electronic data", data from computer files, required additional steps to prepare for entry into the FIS. Electronic data were stored in various formats (e.g., spreadsheets, databases, text files) using different software programs (e.g., WordPerfect, Lotus, Dbase, Microsoft Word, Microsoft Excel, Microsoft Access, or custom designed programs). Data files were imported into Microsoft Access 2000 for temporary storage and ease of access for the data entry technicians. MS Access allowed the technicians to standardize variable codes to provide consistent variable names across all data sets, and to count the number of each species using queries. In some cases, a second trip to the field office was required to collect raw data and develop variable codes consistent with other data sets.

FIS has been developed as a tool to store and relate fisheries data. The FIS database was developed as part of a cooperative effort between the Department and StreamNet (the Northwest aquatic resource information Network, Department Of Energy, Bonneville Power Administration, Division of Fish and Wildlife) Figure1. Data are stored in a series of SQL Server 2000 related tables that are linked to a data source (Figure 2). On the first screen, data entry technicians are required to enter the type or source of the data. In the current project, "Field Notes" and "IDFG Survey" were the most common data sources. The "Year Published" was the same as the year the data was entered (Figure 2). The "Title" further described the source of the data. The "Study Period" was the date the data was originally collected in the field. The "Author" was often unknown and therefore left blank. The "Agency" was either IDFG or BLM. The "Publisher" was IDFG. This information is required to enable sorting data with other data sets.

On the next screen, data related to the sampling location and species presence are entered (Figure 3). The name of the water surveyed is selected from a series of dropdown lists. Streams are sorted by Department regions (Figure 4). Regional streams are listed alphabetically (Figure 5). After the correct stream is selected, location of the sampling site is selected, if available, by choosing the closest downstream tributary or landmark from a list ("From") and the closest upstream tributary or landmark ("To"). A geographic locator helps in the placement of transects in the correct stream reach as well as the correct stream and drainage. The "Species" collected is selected from a drop-down list. "Sampling Dates" must be entered. If only the year is known then the month and day are entered as July 1. In this project, the "Presence" value was always "Documented Present". "Use Type" refers to habitat use (e.g., spawning, rearing, migration, etc.) and generally, was not changed from the default value of "Unknown". "Abundance" refers to the relative abundance and the value was always "Present". "Life Stage" relates to the species age composition in the sample. Values for this field included, adults, juveniles, fry, and, mixed (adults and juveniles). The “Transect Length” and “Average Width” are entered, if available. Technicians were required to enter a value for the “No. Fish” (number of fish). If values for “Transect Length”, “Average Width”, and “No. Fish” are available the “Density” value is calculated. The “Comment” field is used to put pertinent data (e.g., length ranges or describe how the total number of fish was calculated). The FIS is capable of storing length and weight data for individual fish in a separate table (Figure 6).

RESULTS

During the second year, data was gathered from the Department’s Panhandle, Clearwater, Salmon, and McCall and the BLM’s Coeur d’Alene, Cottonwood, and Salmon/Challis regional offices. Over 4,000 stream or stream transect survey records from the Coeur d’Alene, Cottonwood, and Salmon/Challis BLM field offices have been entered into the database and over 90,000 stream, stream transect, or lake survey records from the Department’s Clearwater, Salmon, and McCall regional offices have been entered into the FIS database. These records contain over 100,000 individual fish lengths. The remaining data will be entered by April of 2003.

DISCUSSION

The outcome of this data gathering and retrieval effort will allow electronic data storage and retrieval. Electronic data retrieval will allow the Department to respond more quickly to requests from resource users. Linking geographic location information to fisheries data allows fish managers to produce maps of various fish population attributes. Visual images often are a more effective means of sharing data than tabular data alone. Recently, the development of electronic fishery databases has been crucial in responding to petitions to list fish species under the Endangered Species Act, in developing fishing regulation brochures, in developing native fish species conservation plans, and in tracking collecting permits and reports.

ACKNOWLEDGEMENTS

The following people helped with this project: Curt Kessler and Roman Fernandez were responsible for gathering, verifying and entering the data into the IFWIS. Bruce Murdock was responsible for training and support of the FIS database.

LITERATURE CITED

Murdock, B. 1999. Idaho Fisheries and Wildlife Information System. Idaho Department of Fish and Game, Boise.

FIGURES

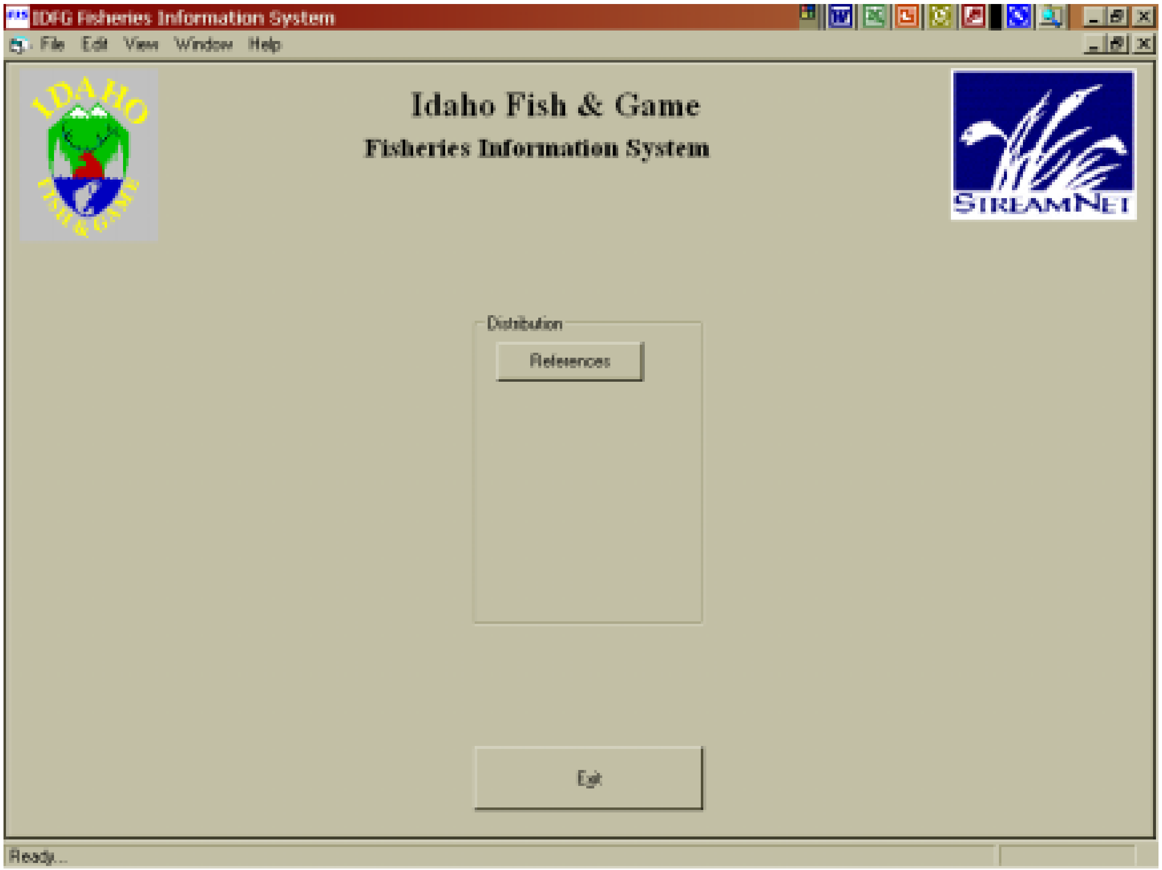

Figure 1. Fishery Information System start-up screen.

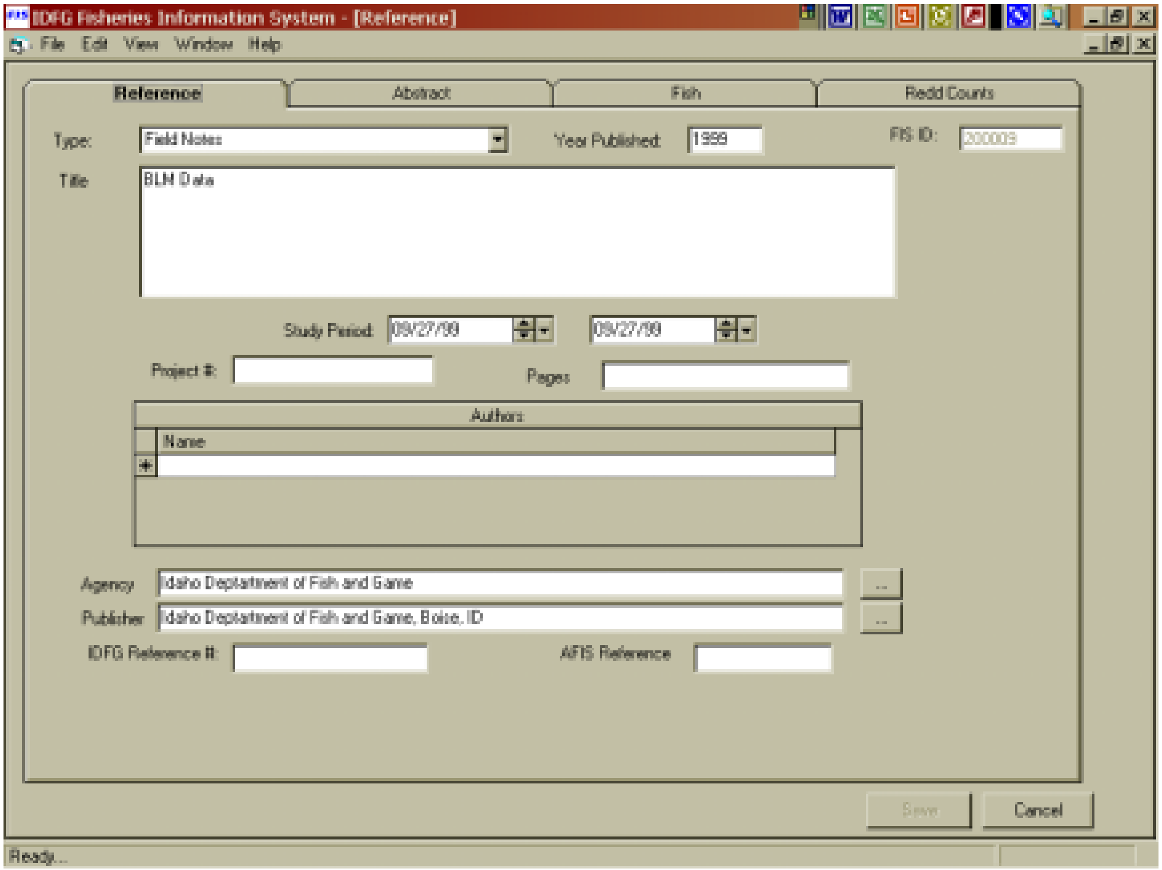

Figure 2. Fishery Information System data input screen for data source information.

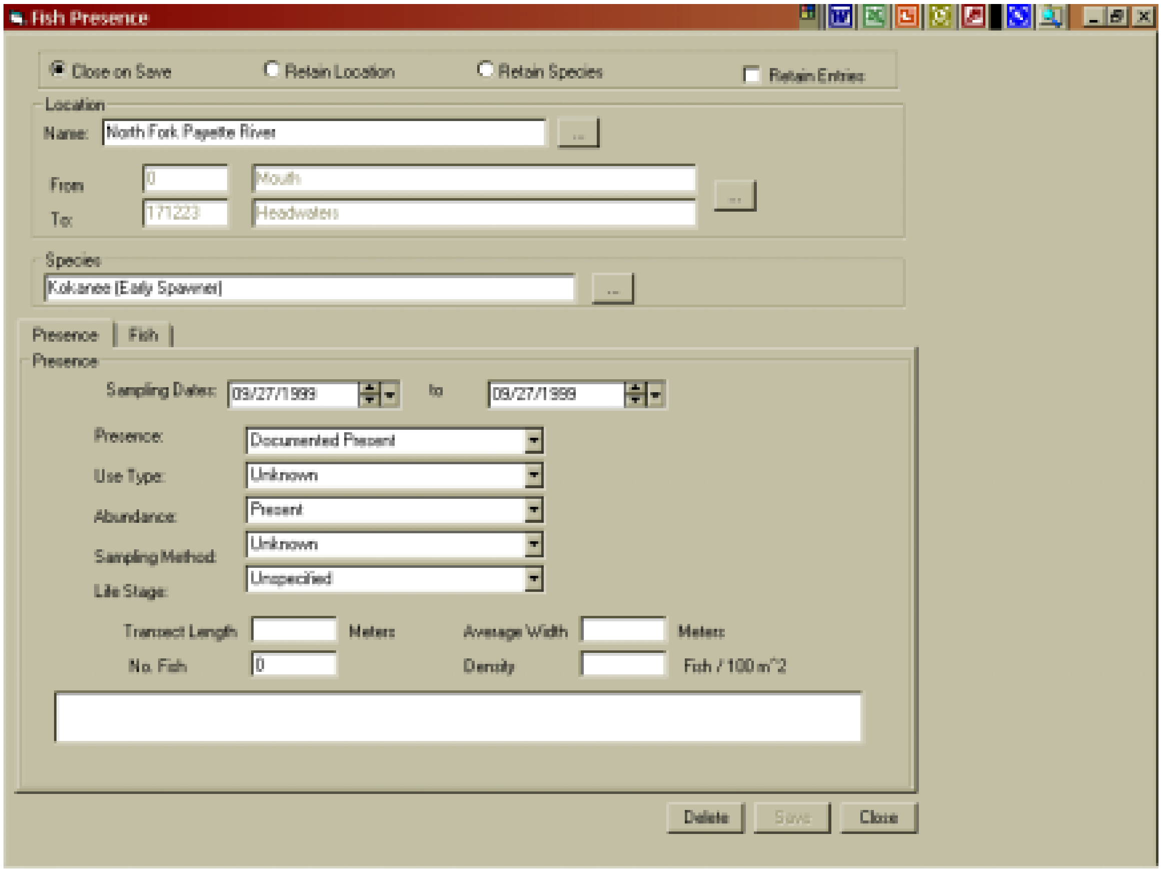

Figure 3. Fishery Information System data input screen for fish presence information.

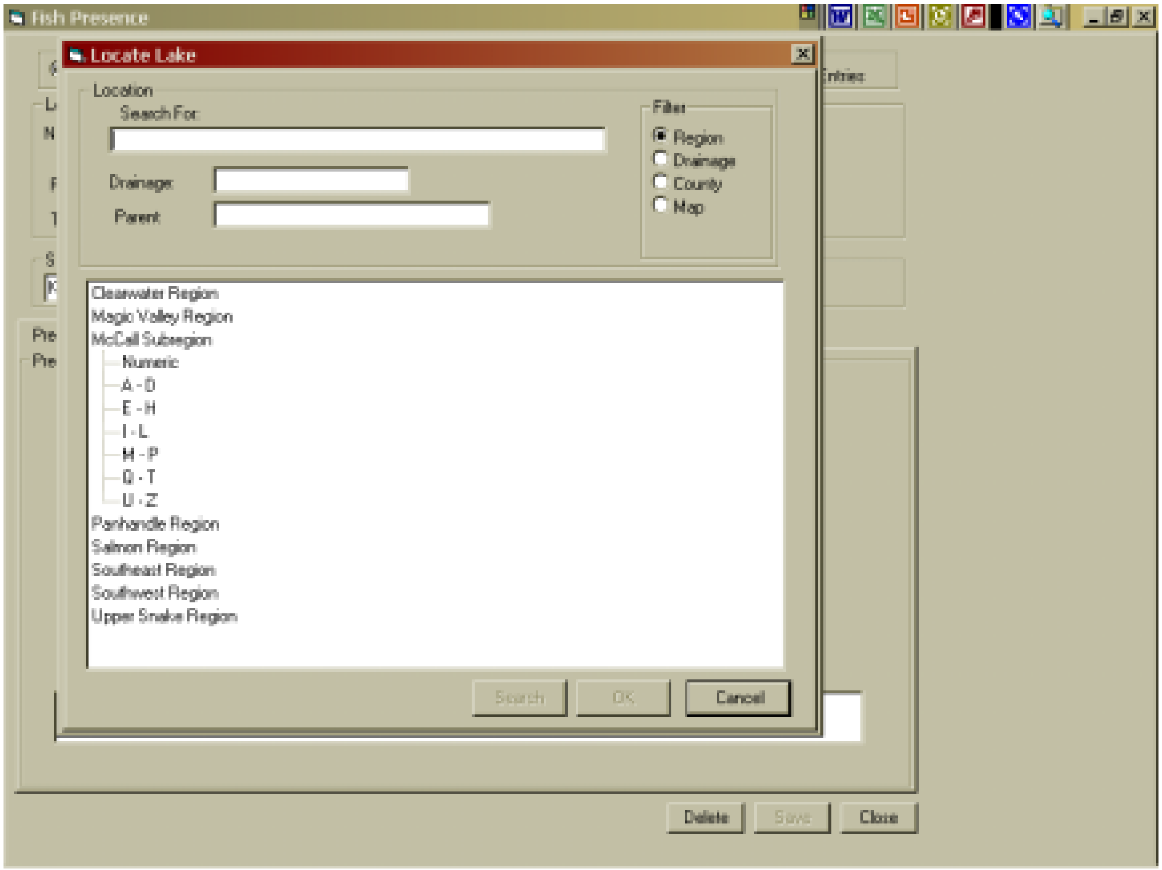

Figure 4. Fishery Information System data input screen for selection of the water surveyed by Idaho Department of Fish and Game region.

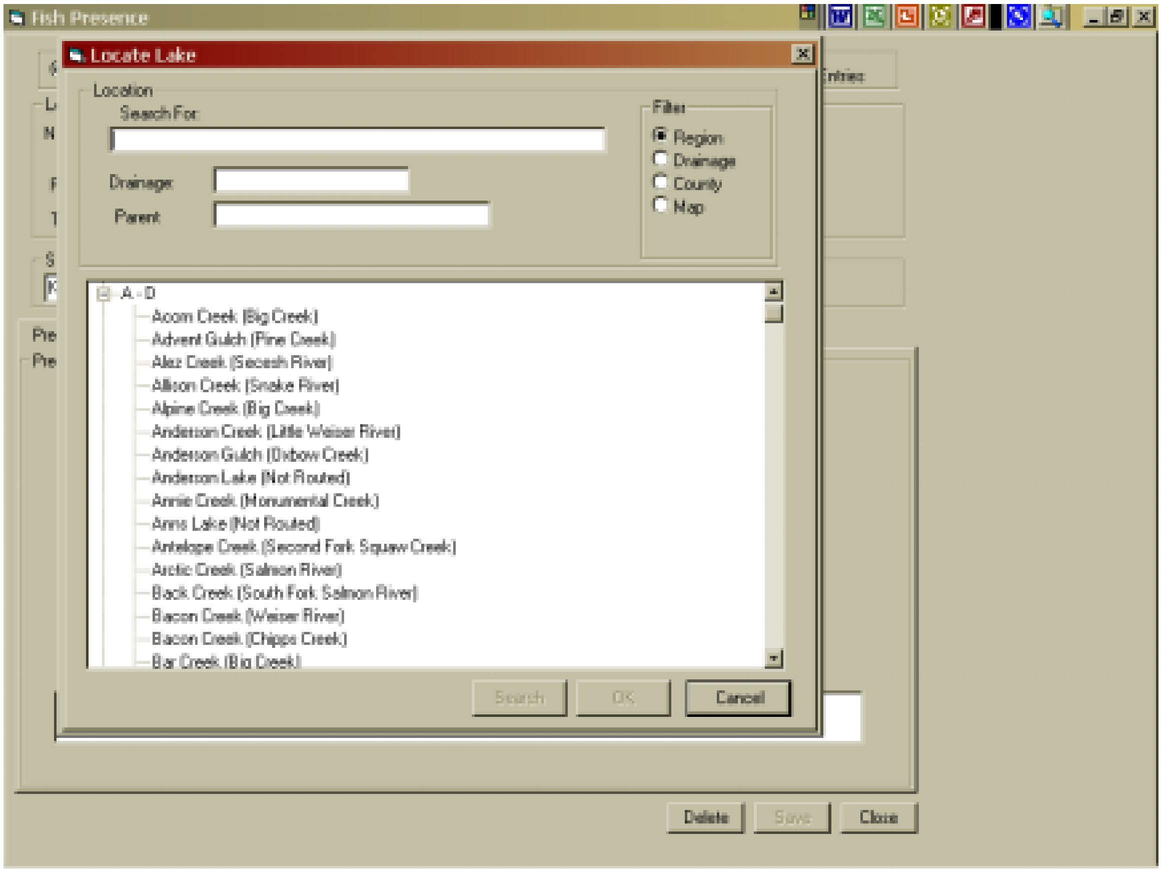

Figure 5. Fishery Information System data input screen displaying bodies of water in alphabetical order.

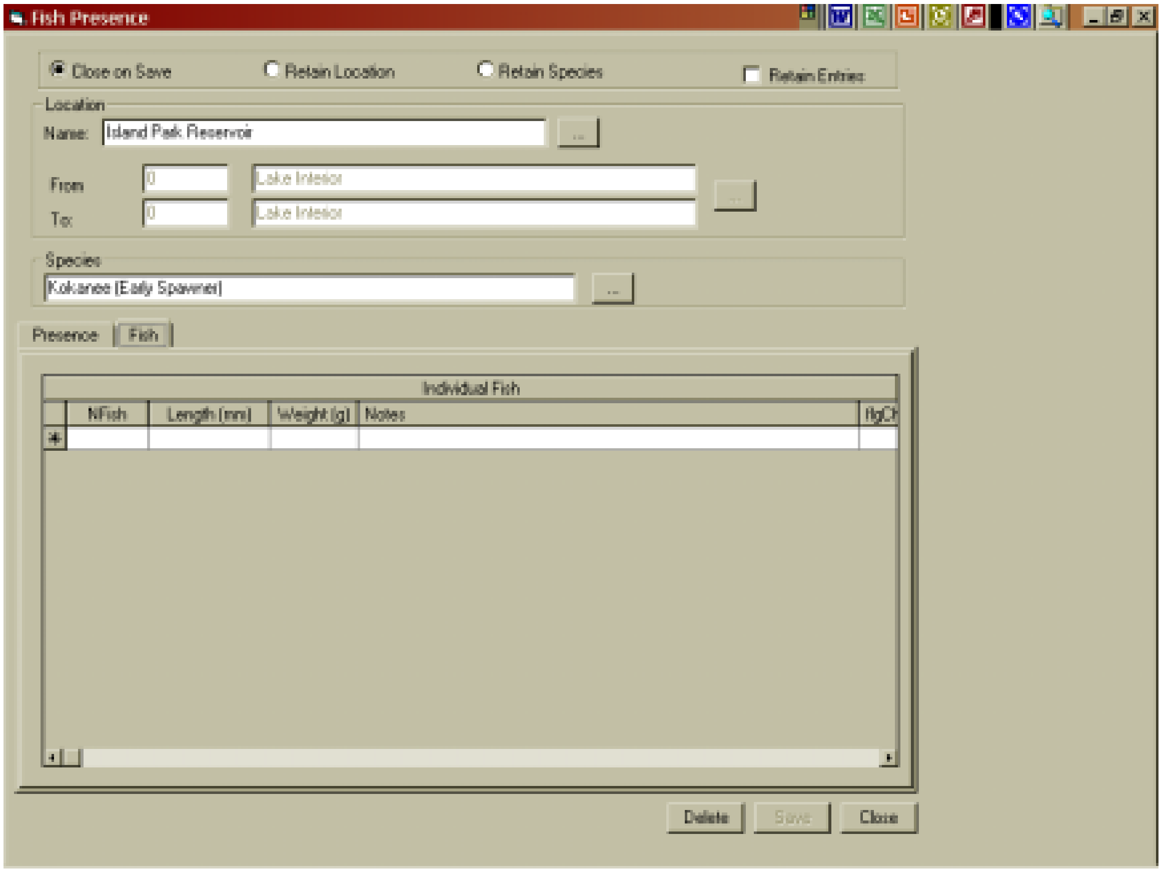

Figure 6. Fishery Information System data input screen for fish length and weight data.

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